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Biographical Sketch of Dr. J. Bernard Brinton.

[With Portrait].

The botanical community of Philadelphia has met with an almost irreparable loss in the very sudden death, on December 6, 1894, of the distinguished scientist, Dr. J. Bernard Brinton, the founder of the Philadelphia Botanical Club.

The many expressions of sympathy and high regard which have been received by his family from his fellow members of the Academy of Natural Sciences, the Torrey Botanical Club and numerous other scientists with whom he was engaged in active correspondence, prove conclusively that his premature death causes a vacancy which will be difficult to fill.

He was preëminent in more than one respect; most emphatically, however, in the happy faculty of imparting to others his own enthusiasm and love for the study of the Natural Sciences. He was noted for the accuracy of his observations in field excursions, in which he was generally recognized as the leader and guide.

His methods were always painstaking and careful, and in his aim to secure choice specimens no trouble, labor nor expense was too great. His botanical specimens were preserved by the most approved methods, mounted in the most artistic style and identified with the most scrupulous care. His mechanical ingenuity was frequently exercised in preparing specimens of fruits, stems and other organs, so as to advantageously exhibit their internal structure. In his desire for absolute accuracy he frequently sent difficult genera to monographers for scrutiny and revision.

This solicitude for accuracy made his herbarium exceedingly valuable for reference and comparison to his unmerous friends, who were in the habit of congregating in his botanical workroom. This place, built as an addition to his home, was familiary known as "The Den." Here he delighted in receiving his friends and exhibiting his scientific collections and numerous devices for facilitating botanical studies.

He was endowed with a marvellous memory for names and physical characteristics. This gift frequently enabled him to recognize specimens which he had not met with for many years. It was always a matter of gratification to him to surprise his scientific visitors with the demonstration of his mechanical skill as an amateur cabinet-maker. He personally constructed in the most skillful manner, his herbarium cases, tables, stands, microscopical cabinets, etc., with a degree of perfection rarely excelled by expert artisans. He also prepared, with that same mechanical skill, all his own collecting presses, which combined the several features of collecting portfolio and drying press. He was a microscopist of no ordinary ability, and took considerable interest in the application of this instrument in the investigation of vegetable histology. His collection of minerals in microscopic crystals has, perhaps, never been excelled in beauty and in the neatness displayed in their mounting. His dexterity in the dissection of botanical specimens was frequently envied by his less expert companions. While so ardently devoted to nature in her various manifestations, Dr. Brinton did not overlook the advantages of linguistic attainments. In his earlier life, much of his time was devoted to the study of German, in which language he conversed fluently. He was also proficient in Latin and French.

Physically, Dr. Brinton seemed to embody the highest expression of perfect manhood. His commanding presence and graceful bearing stamped him at once as a leader. His powerful frame enabled him to endure and overcome great hardship and fatigue.

Dr. J. Bernard Brinton was born near Waynesburg, Chester County, Penna., August 16, 1835. His parents belonged to the religious Society of Friends. His early education was received at this place and subsequently at the High School in Philadelphia,

during the short residence of the family in that city, previous to removal to a farm in Maryland, in 1848. He began the study of medicine in 1857 and matriculated at the Jefferson Medical College, from which school he was graduated on March 25, 1859.

During his college course, the attention of Prof. Samuel D. Gross was attracted to him by the assiduity displayed in his studies, and furthermore by the successful management of an aneurism case treated by digital compression. As a result he was appointed Chief of the Surgical Clinic soon after graduation. He lectured on Practical Anatomy at the Philadelphia School of Anatomy and Operative Surgery, and also conducted a Quiz on Materia Medica. From his graduation to the breaking out of the Civil War he was an active practitioner of medicine, and in 1860 was a delegate to the American Medical Association, held in New Haven, Conn.

But the fire of patriotism proved too strong for the peaceful tenets of his fathers, and led him early in the war to apply for the position of assistant surgeon in the regular army. He successfully passed the rigorous examination, and his commission was dated April 16, 1862, signed by the President, Abraham Lincoln, and Edwin M. Stanton, Secretary of War.

On September 14, 1863, he was appointed Medical Purveyor to the Army of the Potomac, and he retained that position to the close of the war. During his entire army life he continued his botanical studies and collection of plants. At this time it was his good fortune to meet another officer equally interested in the study of the same science, Maj. Gen. G. K. Warren. A wayside flower served as a means of introducing these officers, and the occasion of that meeting was a favorite reminiscence of Dr. Brinton. The collections he made during the Virginia campaign were captured by the Confederate, Col. Mosby, at Belle Plain, May 12, 1864, and burned with the supply wagons. Dr. Brinton himself barely escaped capture. May 13, 1865, he was brevetted Captain and Major for gallant and meritorious services, and on November 16th, of the same year, he resigned from the army. His services to the Union were marked by his usual application and devotion to his sense of duty; and his report at the close of his term of office was considered a remarkably accurate record for one handling a vast amount of material under such turbulent conditions.

Returning to Philadelphia, he continued in the practice of medicine for a few years. Desiring more leisure time for the study of his chosen science, he abandoned medicine and engaged in various manufacturing pursuits. On October 29, 1878, he was elected a member of the Academy of Natural Sciences, and in the same year he connected himself with the Botanical Section of that institution. He was faithful in attendance and contributed numerous specimens, notes and verbal communications. He was an indefatigable collector and made numerous excursions in Pennsylvania and neighboring States. He made a special study of the peculiar flora of the Pine Barrens of New Jersey, in which department he was recognized as an authority. He acceptably filled numerous positions of honor and trust in the Academy of Natural Sciences, and at the time of his death was a member of the Board of Councillors. During the session of the American Association for the Advancement of Science, in Philadelphia, in 1884, he was elected a member, and he acted as guide to an excursion of visiting botanists to the pine barren region of New Jersey.

Only the ardent lovers of nature can understand his feelings on that occasion, when the main object was to show, Dr. Asa Gray and Mr. Caruthers, President of the Linnæan Society, the secluded *Schizæa pusilla* Pursh. Nor can the joy of those gentleman be expressed when their eyes rested on that quaint fern form for the first time.

He was elected to active membership in the Torry Botanical Club of New York, January, 1891. Although publishing but little on botanical subjects, he corresponded with most of the botanical authorities in America and made numerous exchanges. Perhaps his most important labor consisted in inducing the young to study botany, and his greatest pleasure seemed to be in imparting to others, either in the field or in his "den," a portion of his rich store of knowledge. Chiefly with this object in view, he founded the Philadelphia Botanical Club, in December, 1892, of which he was the President from its organization until the time of his decease.

The fundamental aim of the Club is to study the local flora and prepare an herbarium representing the plants found within a radius of fifty miles. Many of the members gratefully remember

the aid they have received in the study of the science from Dr Brinton, whom they regard as their botanical preceptor. An intimate friend, Professor F. Lamson-Scribner, has forcibly expressed this sentiment in the following language:

"Those who have been with Dr. Brinton in his botanical excursions, as I have, will say with me, that in the field he was a keen observer and zealous collector, observing and collecting with an enthusiasm which was always contagious to his party."

"The results of these trips, which we enjoyed to the utmost, have enriched the herbaria of many scientific institutions and those of botanists in all parts of our country. His work and his conversation rarely failed to excite the ambition of others, and I am confident that many young men have received inspirations from their associations with Dr. Brinton, leading them to become better botanists or more earnest students."

Dr. Brinton was married on November 13, 1862, to Sallie W. Clemens, of Philadelphia. A married daughter and two sons survive him. As a source of consolation, after the death of his wife, he engaged more earnestly in botanical studies. It is a peculiar coincidence that he had expressed an intention of retiring from the Presidency of the Botanical Club, and at the time of his decease had in preparation a farewell address. His last evening was spent at the home of a lifelong friend; and the following verses were discussed, which now seem to have fittingly foreshadowed the final sleep that should soon come to one of the participants:

"Oever de stillen Straten,
Geit klar de Glockenslag,
God' Nacht! Din Hart will slapen;
Un' Morgen is ook een Dag.

Noch eenmal lat uns spräken;
Goden Abend, gode Nacht!
De Maand schient up de Däken
Uns Herrgott, hält de Wacht."

A. W. Miller, M. D.,
Geo. M. Beringer,
Jos. Crawford,
Committee.

Food Plants of the North American Indians.

By Dr. V. Havard, U. S. Army.

The maxim that "Necessity knows no law" is well exemplified in the diet of the North American Indians who, when driven by stress of hunger, eat whatever the animal and vegetable kingdoms bring within reach, so that it may be truly said of some tribes that they reject nothing which their teeth can chew or their stomachs digest, however tasteless, unclean and repulsive.

A review, therefore, of all the Indian food plants would include hundreds of species and be as tedious as unprofitable. I shall confine myself, in this paper, to the most important; those formerly, or yet, habitually used.

The subject naturally divides itself into two heads: 1st, plants cultivated; 2d, plants growing wild; and of the cultivated plants we may consider separately those introduced and those which are indigenous.

At the time of the discovery of America many tribes had already emerged from a wild nomadic life and, although still largely depending upon game and fish, were entering upon a partial sedentary agricultural state. So far as a chronic state of warfare would permit, land was set apart for farming purposes and upon it was almost invariably planted the triad of vegetables: maize, pumpkin or squash, and beans. This primitive agriculture was mostly pursued on and east of the Mississippi; in the arid interior comparatively small areas were occupied by agricultural tribes, and these dwelt chiefly in New Mexico and Arizona, and along the Missouri, Platte and Arkansas rivers.

The vegetables just mentioned were introduced from the south, being indigenous to Mexico or South America where a comparative state of civilization had fostered their evolution, and soon found their way to the St. Lawrence river and from the Atlantic to the Rio Colorado of the West. Cartier found them at Montreal in 1535, Champlain among the Five Nations in 1603, Hudson along the river bearing his name in 1609, the English at Jamestown in 1607, De Soto in the Gulf States in 1539, Marquette, Hennepin and La Salle in the Mississippi States, Cabeça

de Vaca among the Pueblo Indians in 1528, and Alarçon on the Colorado in 1542.

The Pacific Coast tribes did not cultivate the soil and depended entirely on the spontaneous products of land and water. It is remarkable that these tribes, although having more or less intercourse with the Missouri Indians on the east and the Pueblo Indians on the south, and always on the verge of starvation, failed to introduce and cultivate the maize or other vegetables. Lewis and Clarke in their memorable expedition across the continent, from the Missouri to the mouth of the Columbia, in 1804 and 1805, found plenty of maize and beans at the Mandan villages, about 60 miles above the present town of Bismarck, N. D., but none north or west of that point.

Maize (*Zea Mays* L.) is probably indigenous to the southern highlands of Mexico. Under the civilization of the Mayas, Nahuas and Aztecs this precious plant received special care and many varieties were developed. Humboldt states that the Aztecs began to cultivate it in 666 A. D. It rapidly spread northward and, it is estimated, in the year 1000 had already reached the eastern States. At the time of the landing of Columbus it was the principal and most common crop of all agricultural Indians, as it soon became that of the white settlers. According to E. L. Sturtevant, one of our best authorities on the history of garden vegetables, the various agricultural species of maize: the flints, dents, softs, sweets and pops appear to be aboriginal forms, and we have no evidence that any new varieties have resulted from our three centuries or more of civilized cultivation. The very hardy form grown in Maine, and which must ripen its grain in three months from the day of planting, is certainly of Indian development, and so are the peculiar red and blue varieties cultivated in New Mexico as well as on the upper Missouri.

The common Kidney Bean (*Phaseolus vulgaris* Savi) is a South American plant; its culture under many varieties spread rapidly through Mexico and the States to Canada and was, next to Maize, the most important crop of farming Indians. The finding of seeds of this species by Professor Witmack in the prehistoric graves of Arizona, not only completed the demonstration of its American origin but likewise proved the antiquity of its culture in our own

country. It is also probable that the Lima Bean (*P. lunatus* L.), which is of Brazilian origin, was used by our Southern Indians.

The third genus of introduced plants cultivated in pre-Columbian time is *Cucurbita*. The Common Pumpkin (*C. Pepo* L.) as well as the Squash (*C. maxima* Duch.) are natives of South or Central America and were grown coextensively with the preceding by North American Indians some of whose names, as applied to certain varieties, have endured to this day. The China or Barbary Squash (*C. moschata* Duch.) was also thought by Asa Gray to be of American origin and, if so, was doubtless known to our Southern Indians.

We come next to the consideration of native plants cultivated by the Indians. It may at once be stated that our gardens and orchards, unless we except the Jerusalem Artichoke and the Sunflower, do not contain a single plant developed by the Indians from any of our wild species. In exculpation we may say that, so far as fruits were concerned, an abundant supply could always be relied upon, while as regards roots, tubers or bulbs, it seems very doubtful whether there are more than two or three susceptible of marked improvement. It is only during the last 40 or 50 years that we have ourselves mostly evolved our many orchard forms of native fruits, while we have not yet produced a single vegetable. The Indians certainly exhibited commendable promptness and industry, after the advent of the whites, in introducing such fruits as were shown to be desirable. Thus the Peach brought into Mexico soon after the conquest was, according to the testimony of Du Pratz, found in general cultivation among the Indians of Louisiana when the French settled that province in 1698, and had become abundant in Georgia at the time of the settlement of the English in 1732. Wm. Bartram describes the carefully planted Orange groves of the Indians which he noticed in 1773. The early introduction and propagation of these two plants by the Indians led to the erroneous impression that they were of American origin.

Of the native plants cultivated by Indians we have no very clear or precise information, but I believe the following list includes most, if not all of them. The first place belongs to the Jerusalem Artichoke (*Helianthus tuberosus* L.). It produces many

edible tubers, sometimes 2 inches in diameter, in our day mostly used for the feeding of cattle, horses and pigs, but which were precious to the Indians on account of their hardiness and prolificacy, retaining possession of the soil for many years. These tubers were mentioned by Champlain in 1603 and brought to France by Lescarbot who, in 1612, describes them as being "as big as small turnips, excellent to eat, with the taste of artichoke but more agreeable, and multiplying in a wonderful way." As the plant is native of the valleys of the Ohio and Mississippi and does not reach any part of Canada, it is evident that the Canadian and New England Indians who planted it must have obtained it from the tribes further south and west, so that we may infer a rather large area of cultivation. The Jerusalem Artichoke is, so far, the only contribution of North America, exclusive of Mexico, to the vegetable garden of the world, and it can be said to be an aboriginal contribution. Strange to note, it is now much more cultivated in the Old World than on this continent.

The allied species *H. doronicoides* Lam., found from Ohio to Missouri, and for a while erroneously thought to be the original of the Jerusalem Artichoke, has similar tubers although of coarser texture; it is quite probable it was also cultivated. The "Indian Potato" of the Assiniboine tribe, mentioned by Bourgeau, is the tuber of a form of *H. giganteus* L., which ranges from Minnesota to the Saskatchawan river.

Apios Apios (L.) MacM. (*A. tuberosa* Mœnch), the Ground-Nut, has edible round or pyriform tubers strung upon long subterranean shoots, varying in size from a nut to a hen's egg; they contain a large proportion of starch and have, when cooked, somewhat the taste of potatoes, being wholesome and nutritious. Rafinesque tells us that this plant was formerly cultivated by the Indians, and still by the Creeks at the time of his writing, not only for the tubers but also for the seeds which, he thinks, are as good as peas. It must have been extensively used by the eastern and southern Indians as all early explorers mention it and some were saved by it from starvation. The tubers were the "Penacs" of the Canadians, the "Hopnis" of the eastern tribes, and apparently the "Openauk" of Hariot, seen in Virginia in 1584 and described as "a kind of round root, some as big as walnuts, some far greater, found in

moist and marshy grounds, growing many together in ropes as though they were fastened with a string." Asa Gray said that had civilization started in America instead of Asia, "our Ground-Nut would have been the first developed esculent tuber and would probably have held its place in the first rank along with potatoes and sweet potatoes of later acquisition." In this connection it should be said that native cultivation does not appear to have had any effect upon the size and quality of this tuber, and that experiments by Vilmorin and others with a view to its improvement have not been successful, although hardly continued long enough to be conclusive. The tuber is of slow growth, requiring two or three years before reaching sufficient size to be useful, and its creeping, scattering habit renders the harvest laborious.

Nelumbo lutea Pers., the Yellow Nelumbo or Water Chiquapin, is the finest of our water-lilies, occurring from the Great Lakes to the Gulf, and westward to Minnesota and Nebraska. In the northern Atlantic States it has only been found in the Delaware river below Philadelphia, in Swartswood Lake, N. J., and in the Connecticut valley, so far out of its range as to lead to the general supposition that the Indians brought and naturalized it in these local habitats. Although difficult of propagation the plant was certainly worthy of the effort. The spindle-shaped, often angled and furrowed tubers are 5 to 10 inches long and weigh from 2 to 8 ounces; when baked they have, says Dr. G. Engelmann, a pleasant, sweet and mealy taste much resembling that of the sweet potato, without anything reminding one of their growth in stagnant water. The boiled or baked seeds have the taste of chestnut and are highly nutritious, while the petioles and young leaves may be eaten as spinage.

Orontium aquaticum L., or Golden Club, the "Tawkee" or "Tawkin" of the Indians, is also an aquatic perennial with deep, bulbous rootstock and large pea-like seeds. Both roots and seeds were much prized by the Indians and, according to Peter Kalm, by some of the white colonists as well; the seeds specially being, after sufficient cooking, quite palatable. This plant grows in ponds along the coast from Massachusetts to Florida. It has also been found in isolated places further inland, near the site of Indian villages, where it is supposed to have been propagated by the natives; but this is a mere hypothesis.

The following native plants were cultivated for their fruit.

The Common Sunflower (*H. annuus* L.) is an American plant which, under several forms, extends from the arctic circle to the tropics and from the Missouri river to the Pacific. It was commonly cultivated by the Indians, from Canada to Mexico, west and east of the Mississippi, being for many of them a staple article of food. The seeds were parched, ground and made into a palatable and nutritious bread said by Palmer and Douglas to be hardly inferior to corn bread. By expression they yield about 20 per cent. of an excellent table oil which the Indians, more mindful of their appearance than of their diet, mostly used for anointing their hair and skin. The culture of this plant in Canada was noticed by Champlain and, a few years after, by Sagard; in that region the seeds must have been obtained from beyond the Mississippi and a little south, through the agency of intervening tribes. As in the case of *H. tuberosus* it is interesting to note that this native plant is much more extensively cultivated in the Old World than in the New.

Prunus Americana Marsh, and *P. nigra* Ait., our two species of Wild Yellow or Red Plum, were, according to several authorities, planted by the New England and Canadian natives, and from the many forms discovered farther west it is not improbable that this culture extended to the Mississippi. Some forty-five horticultural kinds derived from them are described by Prof. Bailey, and it is not assuming too much to suppose that several of them are due to variations initiated by Indian industry. It is probable enough, however, that the native orchard was seldom regularly planted, but oftener the accidental result of seeds dropped in the vicinity of camping grounds and villages.

Prunus angustifolia Marsh, the Chickasaw Plum of the South, is regarded by Prof. Sargent as native of the eastern slopes of the southern Rocky Mountains and of the plateaus extending thence to the Mississippi, and as having been introduced by the Indians into the southern Atlantic States where it soon became extensively naturalized. Clumps of it were found about all Indian villages, and the variations thus started have doubtless developed into some of our seventeen horticultural forms.

Of the cultivation of *Prunus hortulana* Bailey, the common

native species of the middle Mississippi region, we have no direct evidence; but as Plums were planted north and south of that region it is quite probable that the differentiation which has resulted in giving us some twenty-six horticultural forms is also of Indian origin.

At least one species of grape was cultivated for its fruit. *Vitis Arizonica* Eng. has been found growing in rows near Fort Whipple, Ariz., which may be accepted as conclusive evidence of its culture by the Pueblo Indians. It was unfortunate that the Grape thus selected should be described by Munson, the eminent viticulturist, as the least promising of all the species for improvement in fruit. Considering the ease with which Grapes are propagated, by seeds, cuttings or layers, it is likely enough that other species were grown, specially *V. Labrusca*, our northern Fox-Grape, although there appears to be no proof of it.

It seems quite probable that the Pecan and one or more Hickories were more or less planted, as the abundance of nuts is often alluded to by the first explorers. Wm. Bartram, in the account of his travels through the South in 1773, mentions an Indian plantation of Shellbark Hickory. There is likewise some ground for the belief that our native Red Mulberry was cultivated, the fine quality and great quantity of the fruit being mentioned by De Soto and others.

The last of this group of food plants, so far as I know, is *Passiflora incarnata* L., the Maypop of the Southern States, which was cultivated by the Indians of Virginia. Says Captain John Smith: "They plant also maracocks, a wild fruit like a lemon, which increases infinitely"; elsewhere he refers to it as "pleasant" and "wholesome." The fact is that it contains but little nutriment and does not appear susceptible of improvement. The plant itself, on account of its spreading perennial and deep roots, is a noxious weed.

For the sake of completing the list of plants cultivated by aborigines I may be allowed to mention one or two which, although not food plants, were propagated with full as much industry and success as the Maize or the Sunflower; I mean species of Tobacco (*Nicotiana*). The Common Tobacco (*N. Tabacum* L.), of South America, was not known to our Indians except perhaps as var.

undulata Sendtner, the Yaqui Tobacco grown by some of the natives of Arizona and California. The Tobacco cultivated by our Southern and Eastern Indians was the Mexican species *N. rustica* L. now naturalized and occasionally found as a weed, while on the Missouri and farther west the native *N. quadrivalvis* Pursh was mostly used. The var. *multivalvis* Gray of the latter, a form derived from cultivation, or perhaps a distinct species, has been used by the Pacific Indians from time immemorial and is said, by Douglas, to be the only vegetable which the natives of the Columbia cultivated.

I shall now proceed to enumerate the native plants which in their wild or uncultivated state furnish food to the Indians.

Roots, Tubers and Bulbs.

Sagittaria latifolia Willd. (*S. variabilis* Eng.), the Common Arrow-head, is an extremely variable species, extending from the Atlantic to the Pacific and from British America to Mexico. It has tuberous oblong roots the size of a hen's egg, but sometimes as large as a man's fist, which either boiled or roasted were much consumed by the natives all over the land. It was the "Katnis" of the eastern tribes, the "Wabesipinig" or Swan Potato of the Chippeways in Minnesota, and the "Wappatoo" of the Columbia river Indians. It appears to have been, next to Camas, the most useful root of the Pacific slope natives; its name recurs almost on every page of certain chapters of Lewis and Clarke's narrative from which I quote the following: "The most important spot is Wappatoo Island, a large tract lying between the Multnomah and an arm of the Columbia. The chief wealth of this island is found in the numerous ponds of the interior which abound with the common Arrow-head. The bulb, to which the Indians give the name of Wappatoo, is their great article of food and almost the staple article of commerce on the Columbia. It is never out of season, so that at all times of the year the valley is frequented by the neighboring Indians who come to gather it. It is collected by the women; each takes a light canoe into a pond where the water is as high as the breast, and by means of her toes separates from the root the bulb which, on being freed from the mud, rises immediately to the surface of the water and is thrown into the

canoe. In this manner these patient females will remain in the water for several hours, even in the depth of winter."

A form with very large smooth leaves, about as wide as long, from Central to Southern California, thought by Parish to be the introduced *S. Sinensis* Sims, is cultivated by the Chinese in California for its tubers.

We next come to the roots furnished by the Arum Family (ARACEAE). All the plants of this order are impregnated with an intensely acrid and pungent principle. The pangs of hunger must indeed have been keen which drove the natives to experiment with them, but the happy discovery was made that drying and cooking dissipated this noxious acridity and that the roots contained a large proportion of nutritious starchy food. *Arisaema triphyllum* (L.) Torr., the Indian Turnip of our woods, has a bulbous rounded or flattened root, 1 to 2 inches in diameter, which, according to G. H. Harris, is the "Hopnis" of the Seneca Indians and once their habitual bread-root. *Peltandra Virginica* (L.) Kunth, the Arrow Arum, has a short, very thick, deep-seated rootstock, sometimes 6 inches in diameter and weighing 5 or 6 lbs., the "Tawho," "Tuckah" or "Tuckaho" of the natives, and, according to Capt. J. Smith, the root chiefly used for food by the Virginia Indians. "In one day," says Peter Kalm, "a savage will gather enough for a week . . Unless carefully roasted it will prickle the throat extremely, but he so manages it in case of necessity as to make bread of it." He adds that hogs are very greedy of the roots and grow fat upon them. Bartram told him that the savages also boiled the spadix with the berries and devoured them as a great dainty. According to Rafinesque the seeds may be used as a substitute for pepper. The other species, *P. sagittaefolia* (Michx.) Morong, has somewhat similar roots.

The roots of *Calla palustris* or Water Arum, *Orontium aquaticum* or Golden Club, and even of *Spathyema foetida* (L.) Raf., our Polecat Weed, were also used but to a lesser extent. *Colocasia antiquorum* Schott and *C. esculenta* Schott were introduced into the Southern States at a very early date, but probably not before the advent of the whites.

I may mention here, not as a root, but as a root growth, the true "Tuckahoe" or "Indian Bread" of the Southern States, a

fungus, *Pachyma cocos* Fries (*Lycoperdon solidum*), springing from the roots of trees in sandy soil, of about the size of a man's head, with scaly woody bark and white, homogeneous granular interior. It is, like other fungi, destitute of starch but contains about 80 per cent. of carbo-hydrates almost entirely in the shape of insipid pectin whose nutritive value is still undecided but probably not great.

On the low grounds of Southern Florida grows a beautiful plant of the CYCADACAE, *Zamia integrifolia* Willd., the "Coontie" of the Indians, which contains in the caudex and roots about 65 per cent. of an excellent starch sometimes called Florida arrow-root. This plant supplied the Seminoles with food during their long wars with the United States and is now more or less cultivated.

Certain species of *Claytonia*, which we cultivate in our gardens for their delicate beauty, grow from deep edible bulbs whose crisp flesh and nutty flavor were much prized by the natives. I may mention *C. Virginica* and *C. Caroliniana* of the eastern States and *C. Caroliniana sessilifolia* Torr. of the Rocky Mountains and westward. *C. megarrhiza* Parry has a large fleshy tap-root, but it is confined to the summits of the Rocky Mountains and seldom available. *C. perfoliata* Don, of the Pacific States, where it is known as "Spanish Lettuce," is eaten as salad and cooked as greens.

Another elegant little plant of the same Purslane Family is *Talinum aurantiacum* Eng., found everywhere in Texas west of the Pecos river and whose tuberous root is quite edible when cooked.

If we now leave the eastern States and extend our investigation westward, beyond the Mississippi, the first plant deserving of attention is *Psoralea esculenta* Pursh, the "Pomme de Prairie" or "Pomme Blanche" of the Canadian explorers and voyageurs, the "Prairie Turnip" or "Prairie Potato" of the Americans, the "Tipsinah" of the Sioux and the "Tahgu" of the Osage Indians. It is widely distributed, being most abundant on the dry table-lands of the Missouri region, from Montana through Dakota and Nebraska to Kansas. The tuber is irregularly elliptical or conical in shape, ranging in size from a large filbert to a hen's egg, averaging 1½ to 2 inches in length. On section it is seen to be com-

posed of a white granular substance easily pulverized into a light starchy flour. Raw it has a very palatable farinaceous flavor entirely devoid of bitterness; cut into slices and dried it is easily kept and may be found to this day in all the tents of the Sioux Indians for whom it has always been a staple food. They generally eat it cooked, and as they appreciate the advantages of a mixed *pot-au-feu*, boil it with tripe, fattened pup or venison. According to an analysis by Mr. Clifford Richardson (from material I sent him) the tuber contains 70 per cent. of starch, about 5 of a sugar new to chemistry, and 9 of nitrogenous matter under several forms. No serious and prolonged attempt has as yet been made to develop this tuber by cultivation and selection; such attempt is certainly desirable and, if successful, would give us a toothsome, wholesome and nutritious vegetable, remarkable for its large proportion of starch and nitrogen, and peculiarly adapted to our arid regions.

Five other species have, likewise, tuberous edible roots: *P. hypogaea* Nutt., a smaller plant than the preceding, with a somewhat more southern range and probably often confounded and collected with it by the Indians; *P. Californica* Wats. (*P. mephitica* Wats.) and the allied, if distinct, *P. castorea* Wats., ranging from Colorado to California, and affording food to the Pah-Utes; *P. canescens* Michx. of the Southern States, remarkable for its very long subterranean stem ending with a large conical tuber, evidently too deeply buried to have been noticed by the natives; *P. subacaulis* T. & G., a rare and local Tennessee species.

Another member of the Leguminous family is our Wild Liquorice (*Glycyrrhiza lepidota* Nutt.), mostly noteworthy as a very bad weed in the west, everywhere too prevalent. The long slender rhizome has a faint sweetish taste of liquorice, and the Indians sometimes chew it for its supposed tonic and expectorant effects. Much more valuable to the natives is the Chenook Liquorice, a Lupine (*Lupinus littoralis* Dougl.), of the coast of Oregon and Washington, with long tapering granular roots which, when roasted, yield a pleasant farinaceous food.

Our native Umbellifers yield a certain number of useful edible roots. To my taste and within my experience, the most delicately flavored (in the raw state) is that of *Carum Gairdneri* B. & H., the

"Yamp" or "Yampah" of the west, extending from the Rocky Mountains to California and British Columbia, being particularly abundant on the Little Snake, or Yampah, river. The fusiform or conical roots are in close clusters of 2–5, about an inch long and a half-inch thick, consisting, within the blackish skin, of a pure white, farinaceous substance. They have a delicious sweet nutty aromatic flavor, without any bitterness or astringency. Raw or cooked, they have always been highly valued by Indians, specially the Shoshones and tribes of the Snake river and tributaries, as well as by all explorers and settlers. Bears and pigs are very fond of them, often tearing up large tracts of ground in their search. Chemically, they are remarkable for the large proportion of sugar and albuminoid matter they contain. There is little doubt that if susceptible of enlargement by culture, the Yamp would soon become a favorite in the vegetable garden.

Two other species, *C. Kelloggii* Gray, the "Wild Anise" of Central California, and *C. Oregonum* Wats., have similar roots.

Probably still more important to the Indians, among the Umbellifers, on account of its wide distribution and abundance, is the genus *Peucedanum* of which we have some 46 rather closely related species. Ten, ranging from the Rocky Mountains to the northern Pacific Coast, have tuberous edible roots more or less used by the natives. The tubers are seldom over an inch in diameter and almost entirely made up of an homogeneous white starchy substance, palatable when raw, with a faint celery-like flavor, but generally roasted or baked and pounded into flour from which nutritious and wholesome bread or cake is made. The best tuber is probably that of *P. Canbyi* C. & R., the "Chuklusa" of the Spokane Indians. It contains, according to an analysis by Prof. H. Trimble, 17 per cent. of starch, 11 of saccharose, 3 or 4 of albuminoids and 15 or 16 of mucilage. The tuber of *P. eurycarpum* C. & R., the "Skelaps" of the Spokane Indians, has also been examined by Prof. Trimble, who found 35 per cent. of starch, about 10 of albuminoids, only 2 of saccharose and 3 or 4 of mucilage, a composition surprisingly different from that of the preceding. The bulb of *P. farinosum* Geyer, the "Tuhwha" of the Spokanes, is equally good; to it, as well as to other species, the name "Biscuit-root" has been given by the whites.

Other tuberous species worthy of mention are *P. Geyeri* Wats., *P. ambiguum* T. & G., and *P. Cous* Wats., the Indian designation "Kous" applying likewise to other species.

The allied genus *Cymopterus* contains also species with thick elongated or tuberous, more or less edible roots, much prized by the Indians of the Rocky Mountain region and the Great Basin. The best known, as esculents, are *C. globosus* Wats., *C. glomeratus* Raf., *C. montanus* T. & G. The latter has a fusiform parsnip-like root the size of a man's finger, of a very agreeable taste, and a good vegetable in early spring when soft and tender. *C. Fendleri* Gray, the "Chimaja" of the Mexicans, is impregnated with a pleasant anisate volatile oil, and used to flavor meats and make bitters in New Mexico. *C. purpureus* Wats. is used as a pot-herb to season soup and mush by Navajo Indians.

The immense family of the COMPOSITAE presents very few plants for our consideration; the most noteworthy belong to the genus *Cnicus* or Thistle. Lewis and Clarke describe a Thistle on the Lower Columbia called "Shanataque" by the natives, with fusiform root a foot long and about the size of a man's thumb which when baked becomes very palatable and "the sweetest vegetable eaten by the Indians." Mr. Thomas Howell thinks the plant must be *Cnicus edulis* Gray, although the specific name of the latter refers only to the esculent qualities of the young stems which are fleshy and tender; the value of the root appears to have been overlooked. Fremont speaks of another Thistle, not determined, found on the middle and lower part of Bear river (in Idaho and Utah), with root the size of a carrot and very agreeably flavored. I may also mention *C. Drummondi* Gray, whose edible roots are stated to have saved from starvation a lost explorer of the Yellowstone Park in 1870.

The genus *Balsamorrhiza* Hook., of the Rocky Mountains and the Pacific States is characterized by thick and deep roots which exude a terebinthine balsam. They are edible, raw or cooked, after peeling off the thick bark which contains most of the balsamic oleo-resin. Not only the roots but also the young stalks and the seeds were used for food by the Indians.

The same remarks apply to the allied genus *Wyethia* Nutt., which has likewise fleshy roots and large albuminous seeds.

The last edible Composite to be mentioned is *Microseris nutans* Gray, with succulent almost transparent roots full of a bitterish milky juice, which are eaten raw by the Nez Percés Indians.

The PORTULACACEAE contain one species noted from the earliest days as an important Indian food plant, *Lewisia rediviva* Pursh, the "Spatlum" and "Chitah" of the natives, the "Bitter-root" of the whites, ranging from the Rocky Mountains to the Pacific, and giving its name to the Bitter-root mountains of Montana. It is a handsome little plant and very remarkable for its wonderful vitality, having been revived and successfully planted after being kept months in herbarium. The roots, 3 or 4 or more, are curled and twisted and seldom thicker than a goose quill; their brownish-red bark is intensely bitter while the inner white and farinaceous part is quite palatable and nutritious, although having in the raw state a slight bitterish flavor. Boiled or otherwise cooked they are excellent food, extensively used by the Indians. An analysis by Prof. Trimble yielded about 15 per cent. of gum and mucilage, 3 or 4 of albuminoids and 8 or 9 of starch; no evidence of sugar could be obtained. The statement once made by a too credulous observer, and since often repeated by authors that this root "abounds in concentrated nutriment," is certainly very much exaggerated. The other species, *L. brachycalyx* Eng. has similar roots.

In the MALVACEAE we find but one genus with fleshy edible roots, *Callirrhoë* Nutt. One of the handsomest species, *C. digitata* Nutt. of the southern plains, has a fusiform root, in shape and size between a small turnip and a parsnip, said to be even more pleasant tasted than that of *Psoralea* and highly prized by the natives. *C. pedata* Gray, of the Texas prairies, and other species have similar farinaceous roots.

The showy genus *Amoreuxia*, of the BIXINEAE, is represented in our country by *A. Wrightii* Gray, of southwest Texas and *A. palmatifida* DC. (*A. Schiedeana* Planch.) of Arizona and Mexico. The roots of the former are greedily devoured by peccaries and other animals; those of the latter when roasted have the taste of the parsnip and carrot, and are eaten by the Papago and Pimo Indians as well as by the Mexicans under the name of "Sayas."

Turning to the mountains of New Mexico, Arizona and Texas,

we find two Potatoes, *Solanum tuberosum boreale* Gray and *S. Jamesii* Torr., whose tubers have always been among the chief articles of food of the Navajo Indians. The var. *boreale* is so far removed and cut off from its Andean type, by the absence of intermediate Mexican and Central American forms, as to make their close relationship a very interesting fact in geographic botany. Its tubers differ only from those of the Common Potato by their smaller size, being from half to three-quarters of an inch in diameter, and by a peculiar aroma. The tubers of *S. Jamesii* are still smaller, dark-colored and usually covered with minute tubercles. These plants are hardy and of easy growth, readily responding to cultivation, so that it seems strange that the Navajo or Pueblo Indians should not have planted and developed them. The tubers of var. *boreale* are readily improved in size, as shown by Prof. Bailey who has obtained some 4 inches long still retaining their distinguishing aroma. This variety of the Common Potato is beyond a doubt the most promising native food plant of North America outside of Mexico, and was the one most worthy of the attention of the aborigines.

In about the same region and extending north into British America is found the "Kooyah" or "Tobacco-root" of the French (*Valeriana edulis* Nutt.), with large fusiform perpendicular rootstock dividing below into deep and thick branches. This root, black outside and bright yellow inside, is remarkable when fresh for its very repulsive odor and taste, resembling those of chewing tobacco, but when thoroughly cooked is sweet, palatable and nutritious. This plant is of great importance to the Indians of the Great Basin and the Northwest. Fremont, on reaching Bear river, in northern Utah, wrote: "I ate here for the first time the Kooyah, the principal edible root among the Indians who inhabit the upper waters of the streams on the western side of the Rocky Mountains." I doubt whether this plant is worth cultivating for its root, but its medicinal properties might be profitably investigated.

The Lily Family (LILIACEAE) contributes quite generously to the vegetable diet of the Indians, as I shall now proceed to show.

Taking everything into account, abundance, size, taste and nutritiousness, the best of all native bulbs is doubtless that of the

Camas or Quamash (*Camassia esculenta* Lindl.), a showy plant ranging from the Rocky Mountains to California and British Columbia, sometimes so abundant on rich meadows as to tint them a uniform light blue color, suggesting, as expressed by an early explorer, "a lake of clear water." The bulb is globular-ovoid, resembling a small onion; raw it has a mucilaginous, rather insipid taste, but baked it acquires the flavor as well as the color of chestnut. Lewis and Clarke were probably the first white men to eat it, as told in their narrative: "The Indians set before us a small piece of buffalo-meat, some dried salmon, berries and several kinds of roots. Among these last is one which is round and much like an onion in appearance and sweet to the taste; it is called Quamash and is eaten either in its natural state or boiled into a kind of soup or made into a cake called "pasheco." After our long abstinence this was a sumptuous treat."

Camas has always been one of the chief articles of subsistence of all Indians in and west of the Rocky Mountains. They usually bake it in heated pits, sometimes mixed with a black hair-like lichen (*Alectoria jubata*) which grows in profusion on *Larix occidentalis*, the result being a dark brown homogeneous soft mass which is fashioned into large cakes.

The other four species of *Camassia* described, all closely interrelated, have the same kind of edible bulb, with the exception of *C. Cusickii* Wats., the largest and finest, whose bulb is said, perhaps without sufficient investigation, to be nauseous and very acrid.

The bulbs of all the species of *Allium*, or Garlic, are more or less edible and nutritious in spite of the strong-scented volatile oil they contain; many references are made to the "Wild Leekes" and "Wild Onions" by the first explorers who were sometimes compelled to follow the example of the Indians and eat them to sustain life; however, it was their abundance all over the land which gave them value rather than their quality.

Several species of *Smilax* have thick knobby tuberous root-stocks, which were utilized by our southern Indians. The most noted is *S. Pseudo-China* L., with extensively spreading and fascicled roots containing a large proportion of starch readily obtained as a reddish sediment by washing in water, and formerly, according to Bartram, made into soup, bread or jelly. Later these roots

were used by the white settlers, mixed with molasses and parched corn or rice, to make a very wholesome and palatable beer. The rootstocks of *S. Bona-nox* L., *S. glauca* Walt., *S. rotundifolia* L. and *S. Beyrichii* Kunth (*S. auriculata* Chap.) were indiscriminately collected and used with those of the last.

Another eastern plant of this family, but of little consequence, is the Indian Cucumber-root (*Medeola Virginiana* L.) with horizontal yellowish rhizome, 1 to 2 inches long, having a sweetish cucumber-like taste and more medicinal than nutritious.

The Star Tulips and Mariposa Lilies of the genus *Calochortus* so abundant and conspicuous in the Pacific States, have nearly all edible farinaceous bulbs. The best known, as food plant, is *C. Nuttallii* T. & G. which extends eastward to the Rocky Mountains and even the prairie region beyond; it is the "Sego" of the Indians and Mormons; the bulb is about the size of a walnut, very palatable and nutritious, and is still used not only by Indians but by hunters and miners as well.

Brodiæa Smith, a California genus, has likewise edible bulbs; those of *B. congesta* Smith and *B. capitata* Benth., although small, are agreeably sweet and mucilaginous.

Hesperocallis undulata Gray, the Desert Day Lily, grows in the Colorado and Mohave deserts; it has a deep-buried ovate-globose bulb 1 to 4 inches in diameter, with firm palatable and refreshing flesh, quite welcome to Indians and explorers in the absence of other vegetables.

Chlorogalum pomeridianum Kunth., of California, is better known as a soap and a fiber plant than as a food plant, but it is also sometimes called, and for good reason, "Wild Potato." The egg-shaped bulb is 1 to 3 inches in diameter and about 4 long, thickly covered with coarse brownish fibres resembling the coir of the cocoa-nut. A chemical investigation by Prof. Trimble showed 1.87 per cent. of saponin (or 6.95 in the absolutely dry bulb), as well as glucose, saccharose and mucilage. The large proportion of saponin accounts for the use of the bulb as a valued substitute for soap. Cooking eliminates all acrid and injurious substances, rendering the bulb good, wholesome food with much the taste of camas.

In the Sedge Family (CYPERACEAE), we only find 2 or 3 food

plants of minor interest. The Great Bullrush (*Scirpus lacustris* L.) is a widely distributed plant, ranging from the Atlantic to the Pacific and from British America to the tropics. The stalks and leaves are commonly used by many tribes for mats and baskets; the pollen, beaten off and collected on a cloth, is sometimes made into cake. The thick fleshy rootstock of var. *occidentalis* Wats., the "Tule" of the Pacific States, is baked and eaten by hungry Indians. Gen. J. Bidwell describes a honey produced abundantly on a form of "tule" in Nevada, and eagerly gathered by the natives.

Two species of *Cyperus*, the Chufa (*C. esculentus* L.) and the Nut-Grass (*C. rotundus* L.) are extremely noxious weeds in the eastern and southern States on account of their rapid propagation by tuberiferous stolons and difficult extirpation. The Indians, however, looked upon them with favor because of the small edible tubers, specially those of Chufa, which are sweet and palatable, and even now occasionally planted as food for swine.

Finally, it remains to mention one Fern, the Common Brake or Bracken (*Pteris aquilina* L.), the most widely distributed of the order. The blackish rootstocks are eaten in parts of Europe and by some of our Pacific Indians. "They have a pungency," say Lewis and Clarke, "which was disagreeable to us, though the natives eat them voraciously, and they seem to be very nutritious."

FRUITS.

The Indians eat not only all the native fruits which we eat and have more or less improved, but also many others for which we have never cultivated a taste. It is only of these specially aboriginal fruits that I shall speak.

In the Cactus Family the genus *Opuntia*, economically speaking, is probably the most important. Even the fruit of our little Prickly Pear (*O. vulgaris* Haw.) is not entirely worthless, but it is in the arid regions of the Southwest that we find a majority of our 50 native species in their best development. The fruit has a peculiar and mucilaginous taste, sometimes pleasantly acid, but often insipid and mawkish. It contains little nutriment, but quenches thirst in the desert. *O. Engelmanni* Salm, ranging from the mouth of the Rio Grande to the Pacific, is the most noteworthy; not

only do Mexicans and Indians eat its fruit with avidity, but the leaves as well when necessity requires. The leaves, or rather joints, of this and allied species are very juicy and an important fodder for cattle and sheep, being at once food and drink.

The Mexican Prickly Pear or Tuna (*O. Tuna* Mill.), cultivated in Mexico from time immemorial, and whose fruit is found in all the markets of that country, was not known to our Indians; it was brought by the Spaniards into Florida and California where it is now naturalized.

The seeds, not only of the fruit of *Opuntia* but of all edible species of the order, are often separated by the Indians, parched and pulverized and made into excellent gruel.

Most remarkable is the Giant Cactus (*Cereus giganteus* Eng.) the Suhuara or Pitahaya of the Mexicans and the vegetable wonder of Arizona, a tree mostly without branches, the straight, grooved shaft 30 to 50 feet high. The fruit is 2 to 3 inches long, full of a rich crimson pulp of a fine flavor and a great dainty to the Apaches, Pimos and Papagos. From it they prepare a clear light-brown syrup used as a substitue for sugar, and a fermented liquor having the taste and smell of sour beer.

Still larger, sweeter and finer is the fruit of *C. Thurberi* Eng., the Pitahaya Dulce, common in Sonora and Lower California but not yet observed in the United States. Half a dozen other arborescent species of *Cereus* with edible fruit have been described from Northern Mexico and Lower California. Of the low and cespitose species, by far the most interesting from our standpoint is the Straw Cactus (*C. stramineus* Eng.) of Western Texas. The ripe fruit is red, 1½ inches long and 1 thick, with thin skin bearing but few spines and easily peeled off; the seeds are so fine as to be unnoticed; it is equal or superior, in quality and flavor, to the best strawberry.

The genus *Mammillaria* or, as revised by Prof. Coulter, *Cactus*, contains many native species bearing red berries of excellent taste; I have eaten these with great relish on the Upper Missouri from *C. viviparus* and in Western Texas from *C. Heyderi* and others, while in Southern California *C. Goodrichii* is said by Orcutt to yield a delicious strawberry-like fruit.

I may close my remarks upon this order by a mention of the

Peyote (*Anhalonium fissuratum* Eng.) of the rocky highlands of Western Texas and Northern Mexico, a plant which, when chewed, is said to produce a sort of delirious intoxication and on that account sometimes called "Dry Whisky." Another species (*A. Lewini*) of the Lower Rio Grande and Mexico possesses the same remarkable properties. Both are well worthy of investigation.

The seeds or "nuts" of many species of Pine are large and albuminous, forming, in several parts of the country, not only an important but almost an indispensable source of subsistence to the Indians. They are oily and often have a strong terebinthine or bitter taste when raw, but after being roasted they are not only nutritious but also pleasantly flavored.

Our best known Nut Pines are the Single-leaved Pine (*Pinus monophylla* Torr.), so precious to the Indians of the Great Basin, and the Two-leaved Pine or Piñon (*P. edulis* Eng.), perhaps only a variety of the preceding, ranging from Colorado to Texas and Arizona. The wingless seeds are elliptical or globose in outline and half an inch in length. Speaking of their value to the Indians Dr. Newberry says: "They are treasured as their choicest delicacies, and a handful of pine-nuts is to an Indian child as much of a treat as are sugar-plums to our boys and girls. Some of the Piñon groves on the flanks of the Sierra de la Plata, in Southwestern Colorado, have evidently been visited periodically by the Pueblo Indians for ages, for fragments of their peculiar ornamented pottery cover the ground."

The Mexican Nut Pine (*P. cembroides* Zucc.), with leaves mostly in threes but with the same seeds, extends north into Arizona and Lower California. Also belonging to this group is *P. Parryana* Eng., of Southern California and Lower California, with leaves mostly in fours.

The Sugar Pine (*P. Lambertiana* Dougl.) of the Pacific slope, the most gigantic species of the genus, with cone sometimes a foot and a half long, has edible seeds a half-inch long. The Gray-leaf or Digger Pine of California (*P. Sabiniana* Dougl.) has a shorter, thick, massive cone with black seeds, the largest in the genus, nearly an inch long; these are collected in immense quantities by the Digger Indians for winter use, being not only a nutritious food but very digestible and specially suitable for delicate

stomachs. Nearly related to the preceding is *P. Coulteri* of the coast ranges south of San Francisco, with stout, long, strongly incurved cone-spines, and somewhat smaller but equally palatable seeds.

Another genus of Conifers, *Juniperus*, contains three species whose fruit deserves mention: *J. occidentalis* Hook., with its several varieties, extending from Texas to the Northern Pacific coast; *J. Californica* Carr. of Southern California, with a variety extending to Utah and Nevada; *J. pachyphloea* Torr. of Western Texas, New Mexico and Arizona, apparently merging into *J. Mexicana* Schl. of Northern Mexico. They all bear abundant globose greenish or copper-colored berries with a mealy, resinous and not very unpalatable taste. Those of the last-named species are the largest (often half inch in diameter) and best; I have eaten them, not greedily, but without repugnance. Mexicans and Indians consume large quantities of these berries and make them into a bread which, Dr. Palmer says, is of "chaffy and saw-dust consistency." According to the same authority this bread contains the following constituents which would indicate unexpected nutritiousness: Water 14.34, protein compounds 5.69, starch 17.87, sugar 10.66.

Another fruit of much importance to the Indians is that from many of our Oaks. Acorns contain starch, fixed oil, citric acid and sugar, as well as astringent and bitter principles. They are sometimes sweet enough to be eaten raw without preparation, but it is generally necessary to rid them of their bitter principle; this is done by shelling and skinning, then pounding them into meal and washing thoroughly in water; the meal is then ready for boiling into mush or baking into cake or bread. Not long ago I received specimens of *Quercus Garryana* from Fort Gaston, in Northern California, with the information that the acorns were still a common article of food among the Hoopah and other Indians of that reservation. To remove the bitterness they place the meal in a hole dug in wet sand, so that in gathering it up more or less sand is unavoidably mixed with it, enough to have a decided effect upon the teeth. My informant, a medical officer, tells me that he has seen an Indian 45 years old with the crowns of his otherwise healthy teeth half gone, while, in Indians 60 years old, it is not uncommon to see all the teeth worn down, even with the gums.

The White Oaks have sweeter and more palatable fruit than the Black Oaks, and it is mostly from them that the Indians supply themselves. In California the large conical fruit of *Q. lobata* Nee is considered best by the natives who collect enormous quantities of it for winter use. Further north, that of *Q. Garryana* Dougl. is held in the same esteem. All the Live Oaks yield sweet palatable acorns, from the eastern *Q. Virginiana* Mill. to *Q. undulata* Torr., *Q. oblongifolia* Torr., *Q. pungens* Liebm., *Q. Emoryi* Torr., of the Rocky Mountain region, and Q. *Engelmanni* Greene, of Southern California. Our eastern Indians consumed large quantities of the acorns of *Q. Virginiana*, also obtaining from them a sweet oil much used in cooking; they, likewise, ate the acorns of *Q. Michauxii* Nutt. and *Q. prinoides* Willd.

Of the Black Oaks the only one affording food to the Indians is *Q. agrifolia* Nee, the Coast Live Oak of California.

Of the Walnuts and Hickories our Indians knew how to take full advantage, and sometimes from the nuts obtained delicacies apparently unknown to us; thus Bartram states that the Creeks pound the nuts and cast them into boiling water which is then passed through a very fine strainer; the thicker oily part of the liquid thus preserved is called hickory milk; it is as sweet and rich as fresh cream, and an ingredient in most of their cookery, specially hominy and corn cakes.

Our species of *Yucca* are not only handsome and ornamental, but the section *Sarcoyucca* of our arid southwestern territory produces fleshy, banana-like, fruits of agreeable taste, wholesome and nutritious. Unfortunately the fertilization of these plants, depending largely, if not entirely, upon the agency of certain moths, is often imperfect, so that well developed fruit is scant. *Y. baccata* Torr. is the most widely distributed of our species, ranging under several forms from Southern Colorado to Texas, California and Mexico. The ovate or cylindric, more or less beaked fruit is 3 to 5 inches long,with pulp about a half-inch thick over the large seeds. As birds and insects are very fond of this fruit and have the first chance at it, Indians and Mexicans collect it when still green and let it mature in their dwellings; they also eat it green after baking in hot ashes. The young flower buds, when about to expand, are roasted and a prized article of diet. I may also mention that

the leaves of this very useful plant yield strong, flexible textile fibres, while the caudex and root are rich in saponin and an excellent substitute for soap. *Y. macrocarpa* Coville has a stout arborescent trunk 10 to 30 feet high and 1 to 1½ in diameter, and still larger fruit. *Y. Schottii* Eng., of Southern Arizona, also belongs to this section, as well as *Y. Treculeana* Carr., of Northern Mexico.

The NYMPHAEACEAE contain two plants whose seeds are, or were, highly prized by the natives, *Nelumbo lutea* already specially noticed for its roots, and *Nymphaea polysepala* (Eng.) of the northern Pacific slope. The former is called Water Chinquapin, from the resemblance of its seeds in shape and taste to the Chinquapin chestnut of the South; they are eaten raw or cooked and said to be even more delicate food than the roots. The latter plant differs from the eastern *N. advena* chiefly in having a larger number of sepals and a larger fruit; the pod is often the size and form of an egg, filled with well flavored and nutritious seeds which constitute one of the most valuable winter stores of the Klamath Indians.

The ERICACEAE are rich in finely flavored fruits; the many species of *Gaylussacia*, *Vaccinium* and *Gaultheria* furnish the Indians with a notable proportion of their vegetable food. Two species of *Arctostaphylos* are likewise utilized by the natives of California, *A. Manzanita* Parry, the Common Manzanita of the coast range, and *A. tomentosa* Dongl., the Hairy Manzanita of the western part of the State. The small apple-like fruit is decidedly acid before maturity, tasting somewhat like an agreeably tart apple and used for making a cooling drink in summer. When ripe and dried, it is pounded and made into cake or bread.

The Mezquite (*Prosopis juliflora* DC.) is one of the most widespread of trees, ranging from the Atlantic to the Pacific, along the entire Mexican border, and from the Indian Territory, through Texas and Mexico, to South America. It thrives best on bottom lands, where it acquires somewhat the size and aspect of an apple-tree, but will grow almost anywhere, its long slender tap-roots dipping down to great depths in quest of moisture. On arid and fire-swept plains the spreading superficial roots absorb most of the nutriment, becoming thick and tortuous, while hardly any growth is visible above ground.

The Mezquite is invaluable to the Mexicans and Indians of our Southwestern territory, to whom it supplies food and fuel, and sometimes bad beer. The fruit is a yellow bean-like pod, 6 to 8 inches long, filled around and between the seeds with a sweet and very palatable pulp; it contains more than half its weight of assimilable nutritive principles, of which the most important is sugar in the proportion of 25 to 30 per cent. Most herbivorous animals, specially the horse, mule and donkey, are fond of this pod and thrive upon it.

A second species deserves mention, *P. pubescens* Benth., the Screw-Bean or Tornillo, so well characterized by the screw-like fruit. It is abundant from western Texas to California and southward into Mexico. The pulp of the bean is even finer than that of the Mesquite, but is too scant to be of much importance.

Another but very different plant of the LEGUMINOSAE affording fruit to the Indians is *Falcata comosa* (L.) Kuntze (*Amphicarpa monoica* Ell.), the Hog Peanut, a slender, twining perennial, ranging from Canada to Florida and westward to Dakota. The rudimentary lower flowers, borne on filiform creeping branches, bury themselves into the ground where they mature usually only one large fleshy, obovate or pear-shaped seed. This subterranean seed is edible and nutritious. I have seen the Indians dig it up in the spring as far north as Bismarck, N. D. The seeds of the pods on the upper branches, are said to be as good as peas for the table.

Along the banks of the upper Missouri and its many tributaries, grows the Bullberry (*Shepherdia argentea* Nutt.), a most abundant and ubiquitous shrub, sometimes forming miles of impassable thickets. The pistillate plant becomes covered with a profusion of small globose, nearly sessile, bright red berries, which contrast prettily with the bluish-white foliage; they are very acid and hardly edible until touched by frost in the early days of October, when they are sweetened and acquire a pleasant flavor. They have always been one of the staple foods of the Sioux and other Indians who eat them raw and stewed or mixed with other esculents. The whites use large quantities of them for making a delicious jelly, preferred by many to currant jelly. An analysis by Prof. Trimble gave the following constituents: water 71.28, nitrogenous substances 0.14, free acid (citric and malic) 2.45, total sugar 5.47, mucilage and pectin 0.42.

The other species, *Shepherdia Canadensis* Nutt, the Soapberry of the northern States and British America, bears yellowish-red, sweetish-acidulous and bitter berries; these, according to Prof. Penhallow, contain 0.74 per cent. of saponin to which they owe their persistent bitter taste and their well known property of foaming when triturated in a little water and beaten up; the thick cream-like, strawberry-colored foam thus produced is a favorite dish of the natives and, if sweetened, quite palatable. The berries are also preserved, dried or made into jam.

Another plant of this family, with edible fruit, is *Elaeagnus argentea* Pursh, the Silverberry of our northern middle States, and an attractive garden plant on account of its silvery-white foliage and the delicious fragrance of its flowers. The globose berry is dry and mealy and not at all appetizing.

The fruit or hip of several of our wild Roses, after being touched by frost, is sweet and palatable; as it persists through most of the winter, when hardly anything else is available, it sometimes becomes useful food to the natives as well as to birds and mammals. *Rosa Nutkana* Presl., the Nutka Rose, ranging from the northern Pacific coast to the Rocky Mountains, is the most showy of western Roses, having the largest flower and fruit; the latter is juicy and pleasantly acidulous and an excellent antiscorbutic for the Indians of Alaska.

Passing over the many native plants yielding edible seeds, specially of the Gramineae, I shall close with the notice of a few of those whose stem and foliage afford food to the Indians. In this connection the genus *Agave* is first to be mentioned; it is essentially Mexican, only a few species extending into our southern territory, and has always been of the greatest economic importance.

The sap of *A. Americana*, a species sparingly naturalized, but not indigenous, north of the Rio Grande, is converted into a weak alcoholic beverage called "pulque," the national drink of Mexico. Other species, baked, supply the "mezcal de comer," an excellent article of food, and also, by fermentation and distillation, a strong drink called "aguardiente mezcal." The edible part consists of the thick juicy base of the leaves, the fleshy axis and central bud, together forming the "cabeza" or head which is slowly baked in a pit or oven. In the raw state no sugar can be discovered in

these plants, but only a citro-glucosid which by heat is converted into grape sugar and citric acid, so that, by cooking, the cabeza is rendered very sweet and pleasant to the taste.

Our Indians were not slow in learning the value of *Agave* from the Mexican natives; from time immemorial they have utilized our indigenous species, and wherever these grow can be found the stone-lined pits in which the mezcal heads are, or were, baked for food. As our native species do not yield sap enough for the production of pulque, and the process of fermentation and distillation is too complicated for native art, it follows that our Indians never obtained any alcoholic drink from them.

A. Parryi Eng. is the Mezcal of New Mexico and Northern Arizona, one of the staple foods of the Apaches. When properly prepared it is saccharine, palatable and wholesome, mildly acid, laxative and antiscorbutic. *A. Palmeri* Eng. takes its place in southern Arizona. *A. Wislizeni* Eng. is the common Mezcal species of the mountains of western Texas, while *A. deserti* Eng. is that of southern California and adjoining deserts.

On the mesas and foot-hills of western Texas and northern Mexico where *Agave* is rare, the observant Indians discovered a plant which takes its place and is equally useful, furnishing both food and drink. This is *Dasylirion Texanum* Scheele, the Bear-Grass of the Americans and Sotol of the Mexicans. When trimmed down, the head or edible portion consists entirely of the thick, expanded and imbricated bases of the leaves; it is refreshing and palatable even in the raw state, but of much better flavor when cooked. By fermentation and distillation, the Mexicans obtain from it a strong whisky called Sotol mezcal, of penetrating smell and peculiar taste, and the common alcoholic beverage of the frontier population.

The LENNOACEAE have several interesting food plants, the principal of which is *Ammobroma Sonorae* Torr., the Sand-food, a leafless parasite in the sand-hills of southern Arizona and Lower California. The long fleshy stem, creeping in the sand, is edible raw and cooked, but specially palatable when boiled or roasted, the taste being variously described as that of a sweet potato or the heart of a cabbage. It is eagerly eaten by Cocopa, Papago and Yuma Indians, as well as by the Mexicans. It is a valuable substitute for water in the desert.

The Classification of the Archegoniates.

By Lucien M. Underwood.

There has hitherto been much looseness in the coördination of the groups of plants above what have been regarded the natural orders and at the same time wide difference in usage in group names. It is equally apparent that in some respects the botanists have followed a different system of nomenclature from the zoölogists, and they have not even followed a uniform or consistent system among themselves. While it is not possible to crowd a series of forms within the limits of a rigid classification, or accurately coördinate all natural groups of plants in equally related categories, it certainly is possible to follow certain broad principles and maintain a uniformity of nomenclature for the higher groups as well as for genera and species. Leaving particulars for further discussion there ought to be no difficulty in securing the adoption of the following system of group names and sequences:

Sub-kingdom.
Class.
Order.
Family.
Genus.
Species.

This is in skeleton the exact usage of the zoölogists and conforms more nearly with the greater portion of the more recent usage among those whose work is connected with cryptogamic botany. The differences that have been most prominent have arisen among the phanerogamic botanists, and some of the differences have even become almost hoary-headed from long usage. Indeed incipient baldness marks not a few of them, and perhaps a proper ventilation of some of the remainder will cause this to become even more apparent.

1. In place of the term *sub-kingdom*, so generally used by zoölogists, the term *series* has been used. The use of the former

must eventually be followed by all who deal in taxonomy, if consistency is to be maintained.

2. There has been a standing confusion of the terms *order* and *family*. The term "natural order" has a considerable antiquity, but has been confined Slargely to the Spermatophytes. While cryptogamic botanists have by no means been uniform in their terminology, they have in the majority of instances clearly distinguished these two group names. In this they have followed the lead of the zoölogists, for there would be no opportunity in animal classification to confound such distinct group names as the *order* Carnivora and the *family* Canidae. And yet the Ranunculaceae have been called indiscriminately a natural order (or simply an order) and a family. On account of this general confusion among the plants which are popularly the best known, it will be all the more difficult for a time to introduce a uniform and consistent system. And yet it seems to need no argument to show that there is no good reason for perpetuating this confusion in our terminology, and the stand taken on this point by the German systematists, and quite consistently carried out in a number of the most elaborate floras that have ever appeared in any country, will go far toward establishing the correct terminology.

3. There has also been a tendency to use the term *cohort*, much as we have used the term order in the proposed system. This was introduced by Lindley, and its adoption by Bentham and Hooker has had the tendency to fix its use especially in those quarters where other emanations from the same source have had much weight. As the Spermatophytes are not all of the vegetable world and much less not all of the domain of living things, it becomes a question when we broach the matter of uniformity of usage as to whether we shall follow a generally established principle or merely a localized usage. Since all zoölogists and the great majority of cryptogamists have already established the term *order* to include a group of families, it would seemingly be folly to attempt to adopt the term *cohort* in place of the term *order*. Here priority of use might well be argued in addition to the axiom that a part is not more important than the whole.

The adoption of intermediate groups such as sub-classes, sub-orders, sub-families and sub-genera can well be left to monog-

raphers of special groups, for their necessity will evidently vary in every group of plants. It would be a consummation devoutly to be wished if their use anywhere were restricted as much as possible, for a too extended and minute subdivision is not only not demanded by most groups of organic forms, but when introduced in excess tends more to confusion than otherwise and often obscures the real groupings of allied forms.

So far as uniformity of termination is concerned it would seem that the termination-*ales* could properly be adopted for orders and the termination-*aceae* for families where this would not interfere with long established names. In this connection uniformity would seem to be of more importance than priority, especially as the limitations of these larger groups have been so long a matter of uncertainty and variety of opinion. In the groups above orders, there would seem to be less necessity for uniformity of termination than in the orders and families themselves.

In order to illustrate the matter of uniformity of terminology and as a contribution toward securing this uniformity, I present the following arrangement of the sub-kingdom known as Archegoniata. It will be necessary as an introduction to state the limitation of that group as we understand it. In the present condition of our knowledge of plant forms, we can probably find no more satisfactory primary division of the plant world than the following, though of course we are still very far from a natural arrangement. It is practically the arrangement followed in the Engler-Prantl series* with minor modifications.

Sub-kingdom MYCETOZOA.

Sub-kingdom THALLOPHYTA.

Sub-kingdom ARCHEGONIATA.

Sub-kingdom SPERMATOPHYTA.

A few remarks may be to the point in explanation of this division, which in its lower half is necessarily artificial and unsatisfactory.

1. The slime moulds are evidently sufficiently distinct from other plants to warrant a separation in this way. That they have undoubted affinities with the animals no one can doubt, but it is equally clear that they have decided affinities with at least two

* Die natürlichen Pflanzenfamilien, 2: 1, 1–2.

groups of plants, the bacteria and the moulds (Mucorini), that cannot be disregarded. While their structure and function causes them to stand somewhat midway between plant and animal, it would seem more consistent in a systematic arrangement to place them at the bottom of the plant world.

2. Until the inter-relations of the algae and fungi can be more definitely known and some suitable system devised that shall make it possible to unite allied forms on a rational basis, it will be best to maintain this unnatural and heterogenous group which we call Thallophyta. It is true, as has been stated, that the group is practically undefinable, but that is always true of the last division of any series in which those forms are placed that do not conform to any known natural arrangement. The close alliance of some of the lower fungi and algae absolutely precludes the idea of establishing these as primary groups, and of the various systems of subdivision that have been maintained there are none that seem to be founded on real or natural relationships. Unsatisfactory as the group is, we see no present improvement that can replace it.

3. As has been often maintained, there is not a wide distinction between a simple *Riccia* and some of the green algae, and the group Archegoniata is not entirely distinct at its lower limit. This, however, is true of any great group when its outliers are all known, for evolution has not yet resulted in the destruction of all the connecting links. We have for the same reason excluded the Characeae from this group because of their apparently stronger affinities with the other green algae. For a similar reason we have included the Gymnosperms at the upper limit because their affinities when properly understood seem to link them more strongly here than with the higher plants.

With these limitations we present the following outline of the classification of the Archegoniata.

Sub-kingdom ARCHEGONIATA.
Class BRYOPHYTA.
(*Sub-class Hepaticae.*) *
Order Marchantiales.

* I have placed these subgroups in parenthesis as representing group names that modern research seems destined to retire to a merited oblivion. I have elsewhere discussed their abandonment more in detail. *Cf.* Proc. A. A. A. S. 43: 259–274, 1894.

Family RICCIACEAE.
Family MARCHANTIACEAE.
Order Jungermaniales.
Family METZGERIACEAE.
Family JUNGERMANIACEAE.
Order Anthocerotales.
Family ANTHOCEROTACEAE.
(*Sub-class Musci.*) *
Order Sphagnales.
Family SPHAGNACEAE.
Order Andraeales.
Family ANDRAEACEAE.
Order Archidiales.
Family ARCHIDIACEAE.
Order Bryales.
(I omit the somewhat numerous families of this order as unnecessarily extending this illustration.)

CLASS PTERIDOPHYTA.
Order Filicales.
Family OPHIOGLOSSACEAE.
Family MARATTIACEAE.
Family HYMENOPHYLLACEAE.
Family OSMUNDACEAE.
Family SCHIZAEACEAE.
Family GLEICHENIACEAE.
Family POLYPODIACEAE.
Family CYATHEACEAE.
Family MARSILEACEAE.
Family SALVINIACEAE.*
Order Equisetales.
Family EQUISETACEAE.
Family CALAMARIACEAE (fossil).†
Order Sphenophyllales.
Family SPHENOPHYLLACEAE (fossil).†
Order Lycopodiales.
Family LYCOPODIACEAE.

* See foot-note on preceding page.

Family PSILOTACEAE.
Family LEPIDODENDRACEAE (fossil).†
Family SIGILLARIACEAE (fossil).†
Family SELAGINELLACEAE.
Family ISOETACEAE.‡

CLASS GYMNOSPERMAE.
Order Cycadales.
Family CYCADACEAE.
Order Cordaitales (fossil).
Order Pinales.
Family PINACEAE. (*Coniferae.*)
Order Gnetales.
Family GNETACEAE.

The above classification is not proposed from the fact that it contains anything especially novel, but is merely an adaptation of the principle of uniformity in the terminology of the lower groups. So far as unlike things can be compared at all, the above families, as indicated, are groups equivalent with the so-called "natural orders" of the higher plants, e. g. *Ranunculaceae*, *Liliaceae*, *Orchidaceae*, etc.. The separation of the Gymnosperms entirely from the Spermatophytes will doubtless jostle with the ideas of those who still sandwich them in between the Monocotyledons and Dicotyledons, unaware of the modification that has taken place in our ideas of homology in the past two decades, while they have been asleep and failed to note the march of progress over their heads. In some instances it may be desirable to introduce a few subdivisions, but in the above I have purposely left them out except in one instance, that the simplicity of the arrangement might be the more apparent. They should not appear except for sufficient and well founded cause.

GREENCASTLE, INDIANA.

* No lineal series of these families can represent their true affinities.
† The position of many of these fossil forms is still problematical.
‡ The position of this family is by no means permanently decided.

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Writers and publishers of botanical matter are earnestly requested to adopt the forms here recommended. Examples of various citations illustrating the application of the rules in specific cases are given. Correspondence may be addressed to Secretary of the Committee on Bibliography, 1284 Massachusetts Ave., Cambridge, Mass.

In each complete citation there should be given the following items:

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b. Exact title, verbatim, following the capitalization required by the usage of the language in which the title is written, but not necessarily the capitalization employed.

c. Name of periodical or work, abbreviated in accordance with list of journals and catalogue of authors under recommendation 1. *a. b.**

d. Series, if any, in Roman capitals.

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f. Page, in Arabic numerals of ordinary face. In case paging of the paper is in Roman numerals these should be used, preferably small caps. Re-paging in reprints and separates is to be indicated by enclosing the numerals in parentheses. In case the original paging is unknown an em dash should occupy its place, the reprint paging being given in accordance with the foregoing

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*See Proc. Mad. Bot. Cong. 45. Je 1894.

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h. Exact date must be given if possible, written in the mode and with the abbreviations for months used by Library Bureau.* The year at least must be given.

i. Punctuation. Except the comma following the author's name, and the colon following the volume number all the items are to be separated by periods. If another citation follows in the same line it is to be separated from the first by an en dash. Specific, generic and varietal names are to be written and punctuated in the method used in the "List of Pteridophyta and Spermatophyta" issued under the direction of the Botanical Club, A. A. A. S.

j. If it is considered desirable to give other data than series number (if any), volume number, page and date, these should be added in brackets after the date. But useless or unnecessary data should be avoided.

k. Citations of reviews, abstracts, and all such secondary references should be enclosed in parentheses.

Examples.

1. **Lagerheim, G. von.** Ueber das Vorkommen von Europæischen Uredineen auf der Hochebene von Quito. Bot. Centralb. **54**: 324–331. 1893.

2. **Trelease, W.** A revision of the American species of Epilobium occurring north of Mexico. Rept. Mo. Bot. Gard. **2**: 69–117. *pl. 1–48.* 22 Ap 1891.

3. **Sargent, C. S.,** Editor. Populus monticola. Gard. and For. **7**: 313. *f. 56.* 8 Ag 1894.

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*Those abbreviations are as follows: Ja, F, Mr, Ap, My, Je, Jl, Ag, S, O, N, D; i. e., the initial of the month followed by the first distinctive letter.

4. Dietel, P. Die Gattung Ravenelia. Hedw. **33**: 22–48. *pl. 1–5*. 30 Ja. 49–69. 15 Ap 1894.

The foregoing are correct forms for catalogue by author. The following illustrate cases arising under the rules indicated by the letter preceding.

5. Ell. and Everh. Pyren. 491. My 1892.

6. e. Proc. Phil. Acad. **1894**: 53–59. 1894.

The year number, 1894, is the volume number, and not necessarily the year of publication. E. g.,

7. e. Bessey, Am. Pomol. Soc. **1885**: 42. 1886.

8. e. **Mez, C.** Bromeliaceæ. III. Flora Brasiliensis 115: 425–634. *pl. 81–114*. 1F 1894.

Not Fasc. CXV, 425–634, t. 81–114.

9. e. **Saccardo, P. A.** Syll. Fung. 7^2: 481. N 1890.

10. e. j. Bull. Geol. and Nat. Hist. Surv. Minn. 9: 39–42. 2 Mr 1894.

Not 9^2; nor 9 part 2; nor 1894 [part 2].

11. e. j. Linn. Sp. Plant. 6^2: 125. 1852. [ed. Willd.]

12. e. j. **Gray, A.** Man. Bot. 225. 1890. [6th ed.]

13. f. **Peck, C. F.** Rep. N. Y. Mus. **47**: — (18). N 1894.

14. g. Ell. and Everh. N. A. F. *1642*. F 1889.

15. g. Rept. Mo. Bot. Gard. **2**: 98. *d. pl. 28*. 22 Ap 1891.

16. i. Beringer, Am. Jour. Pharm. **66**: 220 My 1894.—Tulasne, Ann. Sci. Nat. Bot. III. **7**: 85. *d. pl. 2. f. 3*. 1847.

17. j. **Bailey,** The Japanese plums in North America. Bull. Cornell Exp. Sta. 62: 3–36. Ja 1894. [Illust.]

The figures are not numbered.

18. k. Ell. and Kell. Jour. Myc. **1**: 12. *d.* Ja 1885.—(Hedw. **24**: 45 *d.* Je 1885.) Peck, (Grev. **22**: 111. Je 1894.)

Proceedings of the Club.

TUESDAY EVENING, FEBRUARY 12TH, 1895.

Vice President Allen in the chair and 29 persons present.

Lieut. Wm. Lassiter, 1st Artillery, U. S. Army, was elected an active member.

A communication from the Secretary of the Council of the Scientific Alliance of New York, transmitting a draft of a proposed act for incorporating the Council, was read. The matter was discussed by the chairman, Mr. Van Brunt, and the Secretary. On motion and unanimously carried, it was

Resolved, That this Society approves of the measure outlined in the proposed act of incorporation just presented by the Council of the Scientific Alliance of New York, and, so far as this Society is concerned, hereby authorizes the said Council to procure the passage of the said act by the Legislature and thereafter to carry the same into effect.

A communication from Professor Halsted, who was announced to speak on "Abnormalities in Plants due to Fungus Diseases," was read, stating his inability to be present.

The paper of Mr. Van Sickle, deferred from the last meeting was then presented, entitled "Notes from my Herbarium." The speaker exhibited and remarked upon a very large number of the rarer plants of northern New Jersey, representing numerous unrecorded localities and several species hitherto unknown to occur within the State. The communication was a very valuable addition to our knowledge of the distribution of the local flora and will be published in a subsequent issue of the BULLETIN.

Professor Britton read the announced paper of the evening, "The Family Ranunculaceae," outlining his proposed treatment of the group in the "Systematic Botany of North America."

WEDNESDAY EVENING, FEBRUARY 27TH, 1895.

Vice President Allen in the chair and about 165 persons present.

Miss Beatrix Jones was elected an active member.

The announced paper of the evening was then read by Mr. Cornelius Van Brunt, entitled "Wild Flowers in and about New

York City." The paper was illustrated by a large number of lantern slides made and colored from nature, the beauty of which elicited many expressions of admiration from the audience. The paper was discussed by the Secretary, who expressed the hope that those present would follow up their acquaintance with our wild flowers made from the lantern slides, by a personal acquaintance made in the field during the coming season, in connection with the excursions of the Club and of the summer class in botany. Dr. Britton called attention to the scientific features of such accurate illustrations, by which he had noted that a rare species of *Asclepias*, *A. decumbens*, not previously reported from this locality, occurred in the vicinity of New York. He also mentioned the strong contrast between the lowland and mountain forms of *Eupatorium purpureum* as endorsing his view that they were distinct species.

Dr. Britton called attention to two important publications, viz., 1, American Algae, Century 1, 1894, by Miss Josephine E. Tilden, of the University of Minnesota; 2, Phycotheca boreali-Americanae, fascicle 1, by Messrs. Collins, Holden and Setchell.

Index to recent Literature relating to American Botany.

Allen, T. F. Japanese Characeae—II. Bull. Torr. Bot. Club, **22**: 68–71. 26 F. 1895.

Describes *Nitella pulchella*, *N. subglomerata Japonica*, and *N. sublucens* as new.

Arthur, J. C. Black-knot and other Excrescences. Trans. Ind. Hort. Soc. 1894: 76–80. 1894.

Arthur, J. C. Discrimination of Diseases without the Use of the Microscope. Amer. Florist, 9: 646. 22 F. 1894. Also Ann. Rep. Am. Carnation Soc. 1894: 8–14. 1894.

Describes seven or eight fungous diseases of carnation and tells how to recognize them aided only by a hand lens.

Arthur, J. C. and **Holway, E. W. D.** Uredineae exsiccatae et icones. Fascicle I. Decorah. pp. 4. *pl. 3*. 31 packets of specimens. S. 1894.

Contains 17 species of Lepto-Uredineae, with drawings of the spores on a uniform scale of magnification.

Bastin, E. S. Structure of *Cimicifuga*. Am. Journ. Pharm. **67**: 121–128. *f. 1–7.* Mr. 1895.

Bates, J, M. Notes on the Trees of Northern Nebraska. Am. Nat. **28**: 1034–1036. D. 1894.

Beach, S. A. Some Observations on the Life-history of *Plowrightia morbosa* (Schw.) Sacc. Ann. Rep. N. Y. Agr. Exp. Sta. (Geneva) 1893: 686–688. 1894.

An infection of young nursery stock from the conidia of 1892 (or possibly from ascospores of the following winter), produced an outbreak of the knots in June, 1893.

Bessey, C. E. Notes on the Distribution of the Yellow Pine in Nebraska. Gard. & For. **8**: 102–103. 13 Mr. 1895.

Britton, E. G. Contributions to American Bryology—IX. A Revision of the Genus *Scouleria* with Description of one new Species. Bull. Torr. Bot. Club, **22**: 36–43. *pl. 227.* 15 Ja. 1895.

Describes *S. marginata* from Washington and California.

Britton, E. G. Contributions to American Bryology—X. Bull. Torr. Bot. Club, **22**: 62–68. *pl. 229–231.* 26 F. 1895.

Discussion of *Physcomitrella patens* and *Aphanorhegma serrata* and a hybrid of the latter with some *Physcomitrium*, with plates.

Britton, N. L., and **Kearney, T. H., Jr.** An Enumeration of the Plants collected by Dr. Timothy E. Wilcox and others in Southeastern Arizona. Trans. N. Y. Acad. Sci. **14**: 21–44. Ja. 1895.

New species in *Aristida, Muhlenbergia, Mirabilis, Berberis, Cercocarpus, Erythrina* and *Kuhnistera.*

Budd, J. L. The Russian Thistle in its natal Home. Bull. Iowa Agr. Exp. Sta. 26: 30–33. 1894.

Campbell, D. H. Observations on the Development of *Marattia Douglasii* Baker. Ann. Bot. **8**: 1–20. *pl. 1–2.* Mr. 1894.

Campbell, D. H. The Origin of the sexual Organs of the Pteridophyta. Bot. Gaz. **20**: 76–78. 16 F. 1895.

Cheney, L. S. Leucoplasts. Bot. Gaz. **20**: 81. 16 F. 1895.

Chester. F. D. Report of Mycologist. Sixth Rep. Del. Exp. Sta. 1893: 103–132. Ja. 1895.

Gives treatment for Peach rot (*Monilea*); observations on rot of scarlet clover (*Sclerotina Trifoliorum*), *Colletotrichum* in cow pea seed and ripe rot (*Colletotrichum phomoides*) of tomatoes.

Collins, F. S., Holden, I. and **Setchell, W. A.** Phycotheca Boreali-Americana. Fascicle I. Malden, Mass. 1895.

Coulter, J. M. New or noteworthy Compositae from Guatemala. Bot. Gaz. **20**: 41–53. *pl. 5–6.* 16 F. 1895.
Describes *Vernonia Luxensis, V. Heydeana, V. Shannoni, Ageratum rugosum, Eupatorium griseum, E. vernonioides, Willoughbaeya globosa, Mallinoa* (*n. g.*) *corymbosa, Polymnia Quichensis, Montanoa Samalensis, Verbesina Donnell-Smithii, Pereziopsis* (*n. g.*) *Donnell-Smithii,* with plates of the two new genera.

Coville, F. V. Report of the Botanist U. S. Department of Agriculture for 1893. Rep. Secy. Agric. 1893: 235–244. 1894.

Crandall, C. S. The Russian Thistle. Bull. Col. Agr. Exp. Sta. 28: pp. 18. *pl. 6.* S. 1894.

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Ellis, J. B. and **Everhart, B. M.** New Species of Ustilagineae and Uredineae. Bull. Torr. Bot. Club, **22**: 57–61. 26 F. 1895.
Species of *Ustilago, Entyloma, Uromyces, Puccinia* and *Aecidium.*

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Ganong, W. F. An Outline of Phytobiology. Educational Review, St. John, New Brunswick. Je. 1894 [Reprint, pp. 15, St. John, 1894].

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Handy, R. B. Peanuts: Culture and Uses. Farm. Bull. U. S. Dept. Agric. 25: pp. 24, *fig.* 1895.

Harms, H. Plantae Lehmannianae in Colombia et Ecuador collectae-Passifloraceae. Beibl. Engler's Bot Jahrb. **18**: Hft. 5. 1–14. 21 Ag. 1894.

Havard, V. Family Nomenclature. Bull. Torr. Bot. Club, **22**: 77, 78. 26 F. 1895.

Hay, G. U. Report on Botany. Bull. Nat. Hist. Soc. New Brunswick, **12**: 69, 70. 1894.

Heller, A. A. Botanical Explorations in Southern Texas during the Season of 1894. Contrib. Herb. Franklin and Marshall College **1**: 1–116. *pl. 9.* 6 F. 1895.

List of a large number of species with synonymy, and critical notes, novelties being described in *Panicum, Rumex, Amorpha, Kuhnistera, Sida, Samolus, Asclepias, Cressa, Verbena, Pentstemon* and *Houstonia.*

Hieronymus, G. Plantae Lehmannianae in Colombia et Ecuador collectae additis quibusdam ab aliis collectoribus ex iisdem regionibus allatis determinatae et descriptae.-Compositae. Engler's Bot. Jahrb. **19**: 43–75. 13 Ap. 1894.

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Native of South Brazil.

Howe, M. A. Chapters in the early History of Hepaticology.—III., IV. Erythea, **3**: 1–6, 25–30. 1 F. 2 Ja. 1895.

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